

THE INFLUENCE OF HYDROTHERMAL ALTERATION ON THE U/PB-SYSTEM OF ZIRCONS - EMP AND TIMS STUDIES

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The U/Pb isotopic system of zircons is a powerful tool to date rocks. Nevertheless interpretation of discordant U/Pb ages is again and again subject of discussions. We focussed our study on the mobilisation of U and Pb under the hydrothermal influence of Ca-dominated basement brines. Electron microprobe studies on discordant zircon fractions from different localities in Sweden, the German Fichtelgebirge and Erzgebirge show considerable influence of percolating Ca-rich fluids. Incorporation of Ca is restricted to disordered metamict zones with high U-content and accompanied by enrichment of Na, Al and Fe. Zones with low U-content remained nearly unaffected by the fluids. Accompanying U/Pb-analyses show that the varying share of zircon substance susceptible to alteration is responsible for strong differences in degree of discordances. To determine the degree of influence of these reactive fluids on the U/Pb-systematics of zircons we carried out a series of hydrothermal experiments using NaCl-CaCl₂-solutions. Experiments lead to considerable changes in the $^{207}\text{Pb}/^{235}\text{U}$ and $^{206}\text{Pb}/^{238}\text{U}$ ratios of the treated zircon fraction. Due to varying changes in the experimental conditions we were able to create artificial discordias. Leaching is not only restricted to Pb. U and the light and heavy rare earth elements are also mobilised during hydrothermal alteration. Furthermore studies on zircons of the Fichtelgebirge show U enrichment within hydrothermally altered areas which lead to geologically meaningless U/Pb-ages. This phenomenon is probably in close connexion with widespread U-ore-mineralisations formed during the intrusion of young variscan granites.